

Fall 2009

Dimensions Fall 2009

Iowa State University Department of Mechanical Engineering

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Message from the Chair



We are back in the rhythm of the academic year, the trees are in full color, and the smell of fall is in the air. This issue of *Dimensions* will highlight some of our accomplishments and people in our department.

We continue to be the most popular degree-granting program on campus and enrolled a record number of students this fall—1,123 undergraduate students and 171 graduate students. The large number of students evokes many educational issues, but our outstanding faculty and staff have risen to the challenge. Two additions to our faculty, Assistant Professors **Erin MacDonald** and **Ross Morrow**, will expand our offerings in sustainable engineering design and build our understanding of how economic and engineering systems impact policy, respectively.

ME senior **Joe Goering** is an example of the high-caliber students who study in our department. Some of our students are taking advantage of our nuclear engineering minor, which is becoming popular for those with an interest in energy systems.

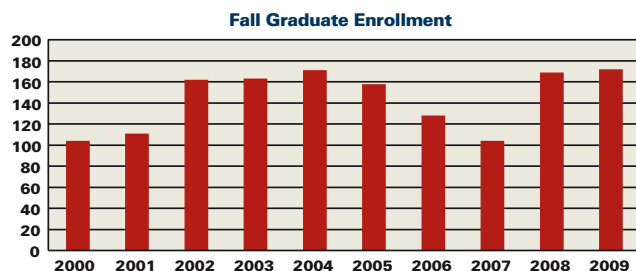
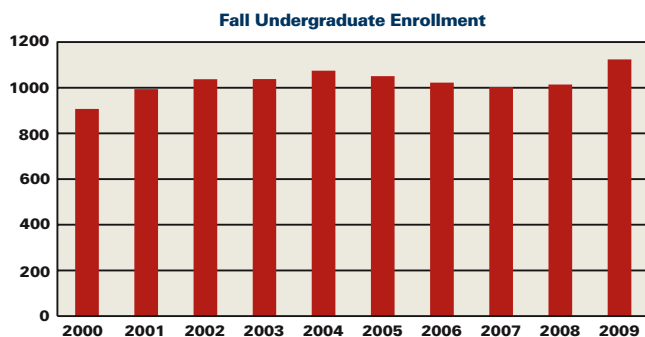
Our new coursework-only master's degree, geared toward industrial professionals seeking a way to upgrade their skills one course at a time, is now up and running. Professionals from all over the country

are finding this distance education option a great way to stay connected to Iowa State while advancing their career.

Faculty continue to perform important cutting-edge research that addresses societal needs. Associate Professor **Mark Bryden** received a 2009 R&D 100 Award for developing a software application that will help engineers design the next generation of highly efficient and low-emission power plants. And **Baskar Ganapathysubramanian**, a young assistant professor, collaborates across campus as he provides mathematical models for several multidisciplinary projects.

We continue to learn more about our department's history and look forward to the information coming from our alumni. You are truly a great source of knowledge, and we appreciate your willingness to share your memories. Please continue to send them to mealumni@iastate.edu.

Ted Haine



Record enrollment numbers

This fall has ushered in Iowa State University's highest-ever enrollment—27,945 students, an increase of more than four percent compared to fall 2008. And the Department of Mechanical Engineering is part of that record-breaking number. The department has a total of 1,294 students enrolled this year; 1,123 are undergraduate students and 171 are graduate students. Combined in both the undergraduate and graduate programs, we have 102 women enrolled.

On the cover

Members of Iowa State's Solar Decathlon team install rooftop solar panels on the Interlock House.

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Solar Decathlon team places 12th in competition

For nearly two years, Iowa State's Solar Decathlon team has been designing and building an energy-efficient, solar-powered home to compete in the U.S. Department of Energy (DOE) Solar Decathlon.

And their hard work paid off. Iowa State's Interlock House took 12th place out of 20 teams—a great accomplishment for the first team from Iowa to ever participate in the competition.

Collaborative work

A project like this required insight from across campus. Iowa State faculty and students from the Colleges of Business, Design, Engineering, and Liberal Arts and Sciences all worked together to design and build the Interlock House.



ME graduate student Tim Lentz was the project engineer for the Interlock House. Photo by Bob Elbert.

ME graduate student **Tim Lentz** appreciated working with different disciplines. "Designers approach things from a very different point of view," he says. "Their stuff is more hands on, mine is more theoretical, so that's kind of cool. I like the random, interesting things they do."

As the project engineer for the team, Lentz coordinated the design of the engineering systems and knew them inside out. He was responsible for installing delicate photovoltaic and evacuated-tube solar collectors and plumbing and wiring in the house.

The project was a unique learning experience for Lentz. "Because of Solar Decathlon, I have a better understanding of the need for building energy efficiency and more respect for how to use energy, even in my own home," he says.

The house

Iowa State's 800-square-foot Interlock House generates enough energy for its needs and is designed to direct any surplus to a companion house or the grid. The team used recycled and recyclable materials, incorporated water conservation strategies such as grey water recycling and rainwater collection, and tested new spatial composition strategies and smart envelope design.

Specific features of the house include

- Rooftop solar panels (photovoltaic modules) that generate electricity to power all electrical devices inside the house
- A solar thermal evacuated-tube system used to heat and dehumidify the interior space and provide domestic hot water

- Radiant floor heating
- Liquid desiccant dehumidifier
- Passive heating and cooling features such as a sun porch and ventilation
- Energy-efficient construction techniques, including R-12 windows, R-48 wall and roof insulation, and airtight construction
- Energy-efficient appliances and lighting
- Universal design, ADA accessible
- Furniture, lighting fixtures, and ceramics created by Iowa State students; cabinetry created by students at Des Moines Area Community College

The team unveiled the house to the public at the end of August, with many in the community interested in the team's work. "I felt like I had already talked to half the people in Ames and then saw this huge line when I finally took a break," Lentz says. "The turnout was so great we ended up staying an extra half hour to talk to everyone."

Getting from here to there

Each team had to travel to the National Mall in Washington, D.C., erect their houses, and compete in ten different contests to determine an overall winner.

Getting there was no easy feat. Transporting the Interlock House to D.C. in four trailer trucks took some planning.

To deconstruct the home, the team first packed up the house's energy-efficient appliances and specially designed wooden furniture into crates.

Then, led by construction engineering graduate student and Solar Decathlon project manager Aaron Brnich, the team strategically—and carefully—took apart the house. To reduce the risk of fracture during the trip, the team removed the majority of the house's windows—along with the adjustable, paneled glass Nanawall surrounding the sun porch. Team members also disconnected and stored the roof's photovoltaic panels and evacuated-tube thermal energy collectors.

[story continued on page 4](#)



After successfully competing in the U.S. Department of Energy's Solar Decathlon on the National Mall in Washington, D.C., Iowa State's Solar Decathlon team will move the student-designed and built solar house to Honey Creek Resort State Park at Rathbun Lake in southern Iowa.

ME senior keeps eyes on the bigger picture



With a fundamental understanding of engineering gained from his father, **Joe Goering** entered Iowa State's ME department four years ago hoping to earn a degree that paired his desire for hands-on, practical work with his technical way of thinking.

As a senior ready to graduate in May, he says he got what he was looking for—and then some.

His academic career started with a great peer mentor who ended up inspiring Goering to become a mentor himself. "My peer mentor was always very approachable," he says. "I could talk with him about any problems with my class work, and he even looked over my résumé and cover letter, helping me land my first internship."

Now, Goering provides students with similar help, focusing on lessons they may not get in regular classes. From help navigating the online job directory to getting students acquainted with Iowa State, he says his main objective is to make the transition easy for students and support them as they work through the crucial core classes.

"When students come to me with frustrations or difficulties, I try to remind them that ME is an exciting field that offers a lot to enjoy," he says. "Keeping my eye on the bigger picture helped me get through the first couple of years, and I'm glad I stuck with it."

The bigger picture for Goering's senior year includes being president of the Engineering Student Council (ESC), participating in the Engineering Leadership Program (ELP), and representing undergraduates on the department's chair search committee.

Goering says these extracurricular activities introduce him to different perspectives and are an opportunity for him to develop professional skills, something he feels adds a lot of value to his experience as a student.

As the ESC president, Goering's biggest responsibility is to run general meetings. There are seven committee members on the council, and they work on allocating money to student organizations, organizing the leadership banquet in the spring, helping student organizations collaborate, and coordinating outreach events with younger students and the community.

ELP, a four-year cocurricular program at Iowa State that creates a values-based learning community of engineering students committed to making a difference in the world, has introduced him to new people and a different way of thinking about things. The group discusses everything from books to lectures to current events—a process that Goering says broadens his worldview.

Most recently, Goering began serving on the ME department chair search committee, where he attends meetings and acts as the voice of ME undergrads. "Even though undergraduate students don't often interact with a department chair on a day-to-day basis, I'm glad I've got the opportunity to provide input," he says. The department is starting to receive applications and evaluate candidates, something Goering expresses as a new and very interesting process.

Goering appreciates the challenges each of these activities brings him, and along with pushing him beyond his comfort zone, he says they have also helped him develop a specific interest for his future career.

"For ELP, we had to attend Thematic Year presentations that were hosted by the Engineering Policy and Leadership Institute," he explains. "They opened my eyes to the possibilities of working in the energy side of mechanical engineering—something I hadn't really thought about much until that point."

Energy is something Goering thinks about a lot now as he is beginning to look for a job. His internship in the diesel engine division at John Deere this past summer and his coursework helped continue his ever-growing interest in energy. "It's an area that offers a lot of variety with a large impact," he says. "I like that my mechanical engineering degree opens doors to a career with such enormous potential."

Solar Decathlon continued from page 3

And they had to remove the house's roof and siding before detaching the walls from the ceilings, floors, and each other. The Interlock House's forward-thinking, modular design allowed many demarcated segments of the house to be separated, using nothing more than a simple utility knife.

Once disassembled, a crane lifted pairs of the Interlock House's six primary modules onto separate trailers. Because the modules measure between 13 and 14 feet wide, they overhung the eight-by-six-foot trailers, requiring the drivers to exercise caution while navigating the 1,000-mile trek to the nation's capital. The house's decking was loaded onto the final trailer.

The team was given one week to rebuild the Interlock House on the National Mall, where all competing houses were open for public tours as part of the DOE's Solar Village from October 8 to 18.

Coming back home

With the competition behind them, the team will relocate the house to Honey Creek Resort State Park at Rathbun Lake in southern Iowa. When they reconstruct the house, the team will wire it for data collection, allowing it to serve as a laboratory for green building technology and systems performance testing.

"This project received a lot of great support," Lentz says. "Our success with the house is a great example of how working together is an important part of developing solutions for energy problems across the world."

Undergraduate explores engineering through research



Junior **Elizabeth Welch** didn't always know she wanted to be an ME. When she came to campus, she hoped her experience with the Community Living for Undeclared Engineers (CLUE) learning community would help her make a decision.

CLUE focuses on introducing undeclared students to the different engineering disciplines, and when Welch heard about mechanical engineering and how broad the discipline is, she gravitated to the major.

Even with a major declared, Welch is still sorting out where she wants her academic career to take her. That's when she started looking into research.

In spring 2009, Welch participated in the honors research mentor program. She got to work on a project in the materials science and engineering department with Associate Professor **Ralph Napolitano**, where she learned the ropes of working in a lab.

This summer, Welch was SURFing (Summer Undergraduate Research Fellowship) in the materials science and engineering lab as part of a National Institute of Standards and Technology (NIST) research fellowship.

"During my spring research experience I worked in the lab a couple hours a week and in my office the rest of the time, which worked well with my schedule," Welch explains. "This summer, I was completely immersed in the project."

The project in the NIST lab to which Welch was assigned is building a nanoindenter to help advance the understanding of materials, and she worked on a project that involved setting up a workstation to get readings from the machine.

"The nanoindenter presses a load down onto a material, and then you can look at the resulting deformation," Welch says. "Based on the readings, you can determine the properties of the material."

One of the toughest components of the project was to learn the programming language, LabView, that controls the indenter. Not having any programming experience, Welch jumped in and began teaching herself through tutorials and the book she was given. While it was unexpected, she says it's always nice to learn a new skill.

As for where Welch will end up focusing as she continues her academic journey, she's still unsure. "Research is definitely a possibility for my future," she says. "I'm really interested in biology, and these experiences gave me an idea of how to work with groups of people toward a common goal. I'm excited about applying these skills to the next opportunity that comes my way."



ME student earns Carver Scholarship for biorenewables research

Mark Mba Wright, a doctoral student in mechanical engineering with a chemical engineering minor, has been awarded the 2009 George Washington Carver Scholarship Prize for Outstanding Student Achievement in Biorenewables.

This is the second year the Bioeconomy Institute and the Biotechnology Industry Organization (BIO) have awarded the \$4,000 prize recognizing the research contributions of a student in Iowa State's Biorenewable Resources and Technologies (BRT) graduate program.

Wright, who is just beginning work on his PhD, has already had a remarkable academic career. He has published three journal articles on technoeconomics of biorenewable technologies; participated in a collaborative project involving Iowa State, the National Renewable Energy Laboratory, and ConocoPhillips Company to compare the costs of producing transportation fuels from biochemical, gasification, and fast pyrolysis pathways; and co-authored a paper about and participated in the Scientific Committee on Problems of the Environment Biofuels Project in Gummersbach, Germany, which addresses environmental concerns of large-scale adoption of biofuels.

In addition, he has presented at several conferences including the 29th Symposium on Biotechnology for Fuels and Chemicals in Denver, Colorado; 2007 and 2008 Iowa Academy of Science Conference; and 2006, 2007, and 2008 Iowa Bioeconomy Conference.

He completed his master's degree in the BRT program, appreciative that the multidisciplinary program encourages learning about biofuels from different perspectives. "I am honored to receive the award, and I hope it raises attention to the work being done by the faculty, staff, and students involved in the BRT program," Wright says. "As a graduate of the program, I am glad students who put in effort to tackle the challenges of developing biorenewable products for our society are recognized."

Robert Brown, Gary and Donna Hoover Chair in Mechanical Engineering and director of the Bioeconomy Institute, nominated Wright for the award. "Mark's noteworthy publications are built around a systems perspective on problems in biorenewables, which aligns with our emphasis at the Bioeconomy Institute," Brown says. "This award provides the institute with an opportunity to recognize students' early achievements as emerging researchers, as well as attract high-quality students to a new field."

After graduate school, Wright plans to continue research in the biofuel area by applying for industrial and academic positions with a strong emphasis on biomass conversion research. He was recognized for the award at the BIO World Congress in Montreal in July and will also be honored during the 2009 Growing the Bioeconomy Conference at Iowa State University in December.

Accelerating research with computational models

While **Baskar Ganapathysubramanian** admits experimental research has never been his greatest strength, his contributions to such projects can help teams quickly arrive at solutions.

Ganapathysubramanian, assistant professor and William March Scholar in Mechanical Engineering, uses advances in applied mathematics and high-performance computing to model, design, and control variables in experiments. The

The team hopes to have a market-ready solution within the next few years, and Ganapathysubramanian and his graduate students are one reason such a quick turnaround on the project is possible. They are working to determine the appropriate combination of materials and processes necessary to create an organic solar cell with high efficiency.

Once they have a reasonable set of values, they will submit their recommendations to

Chaudhary, who will fabricate and test the material. This approach expedites the time it takes to develop a viable solution because the experimentalist doesn't have to spend as much time with unsuccessful trials.

The computation team runs its models on Cystorm, Iowa State's second supercomputer. The computer boasts a peak performance of 28.16 trillion

calculations per second and is powered by 3,200 computer processor cores. With this advanced technology, they can run more models and arrive at solutions sooner.

"We are also developing a cost benefit analysis for the cells," says Ganapathysubramanian. "Because the organic cells are so much cheaper to produce, even if we only reach 20 percent efficiency it becomes feasible to deploy the end-product and continue working behind the scenes to improve the efficiency."

In another project, he is developing a tool to advance the process of designing new materials. Along with **Krishna Rajan**, professor of materials science and engineering, and **Srinivas Aluru**, professor of electrical and computer engineering, Ganapathysubramanian's group is developing new methods and models to assess how materials change with slight modifications to their properties.

Ganapathysubramanian says the overall system being used in this project can

Graduate student honors and awards

Michelle Buehler

Fall 2009 Seward, Ratcliffe, and Galloway Foundation Mechanical Engineering Fellow

Le Chen

Fall 2009 Miller Fellowship

Rachel Dudley

Fall 2009 Miller Fellowship

Rahul Garg

Summer 2009 Research Excellence Award

Shuangyan Lei

Fall 2009 Miller Fellowship

Yuanhong Li

Summer 2009 Research Excellence Award

Minhua Long

Fall 2009 Miller Fellowship

Tyrone Moore

Fall 2009 Alliance for Graduate Education and the Professoriate (AGEP) Fellowship

Jing Ren

Fall 2009 Seward, Ratcliffe, and Galloway Foundation Mechanical Engineering Fellow

Victor Roa-Baerga

Fall 2009 Seward, Ratcliffe, and Galloway Foundation Mechanical Engineering Fellow

Jinjuan She

Fall 2009 Seward, Ratcliffe, and Galloway Foundation Mechanical Engineering Fellow

Kristin Tucker

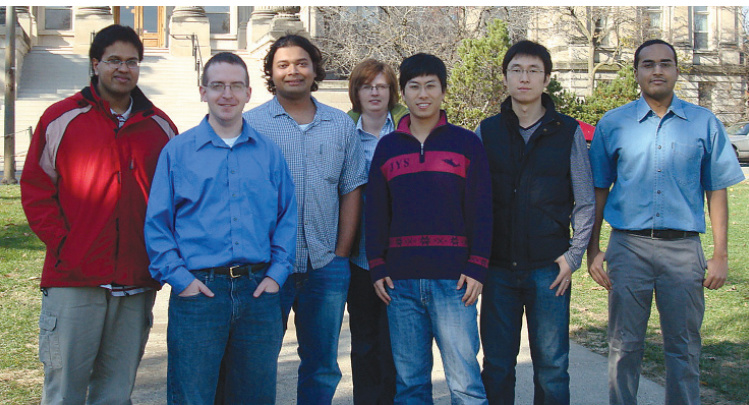
Fall 2009 Dean's Fellowship

Melissa Wickham

Fall 2009 Seward, Ratcliffe, and Galloway Foundation Mechanical Engineering Fellow

be applied across science. "The tool extracts important features from the data and allows an experimentalist to zoom into a specific aspect of the material," he explains. As a result, the researchers can tackle huge amounts of data more efficiently.

By nature, his work is interdisciplinary, which is something Ganapathysubramanian appreciates and encourages. "In a limited time span, it's not practical for one person to have the expertise to solve such significant problems," he says. "A cross-disciplinary team adds value to engineering and is essential to deliver results."



Assistant Professor Baskar Ganapathysubramanian (third from the left) and his students develop mathematical techniques and computational tools in the Computational Physics and Mechanics Laboratory.

mathematical computations he constructs simplify complicated issues and provide experimentalists with specific solutions for vast engineering problems.

Currently contributing to five different projects across the college and campus, his research spans from solar and wind energy to materials science to flapping wing aircrafts.

Working with **Sumit Chaudhary**, an assistant professor of electrical and computer engineering, Ganapathysubramanian is helping develop low-cost organic solar cells. These organic cells will replace the more traditionally known silicon cells.

Solar cells made of silicon have been thoroughly studied for more than 40 years and can be fabricated to reach their maximum efficiency, though it's an expensive process. Organic cells, on the other hand, are created from polymers and designed to be flexible, making them cheaper to produce and use for many different purposes.

Research briefs

Companies with ME ties take 1st and 2nd in business competition

BodyViz, an Ames virtual reality company developed by **Jim Oliver**, director of Iowa State's Virtual Reality Applications Center and professor of mechanical engineering, and **Eliot Winer**, associate director of the center and associate professor of mechanical engineering, has taken the top prize of \$25,000 in the fourth annual John Pappajohn Iowa Business Plan Competition.

Innovative Energy Solutions, Inc., a company developed by ME professor **Atul Kelkar**, took second place and was awarded \$15,000. The company created a technology (process and device) to convert waste hydrocarbons, such as refinery waste or plastics, into liquid diesel fuel.

Two ME professors receive funding from the American Recovery and Reinvestment Act

Iowa State University researchers have so far won 19 grants worth a total of \$7.7 million from federal agencies awarding money from the American Recovery and Reinvestment Act. The Department of Mechanical Engineering has two professors who received awards:

- \$476,449 from the National Science Foundation to **Abhijit Chandra**, a professor of mechanical engineering, and **Ashraf Bastawros**, an associate professor of aerospace engineering, to develop a multiscale and multiphysics model to test chemical mechanical planarization in a nanoscale manufacturing process for integrated circuits
- \$266,048 from the National Science Foundation to **Xinwei Wang**, an associate professor of mechanical engineering, to develop a laser-assisted technique to measure the thermal characteristics of ceramic nanowires

Department hosts Complex Fluid Systems workshop

On October 7, the Complex Fluid Systems research group hosted a one-day workshop on campus to bring together leading university experts in the areas of complex fluid systems, foster interactions, and promote future collaboration in this field. More than 35 faculty, postdocs, and students attended the event.

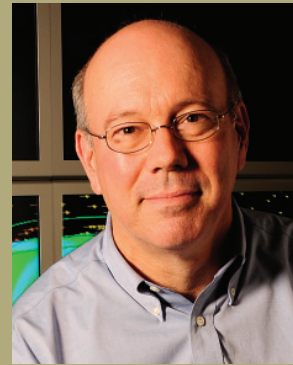
During the morning of the workshop, experts delivered presentations on research directions and Iowa State expertise in the following technical tracks:

- Colloids, Polymers, and Biofluids
- Particle-Laden Flows, Sprays, Turbulent Reactive Flows
- Soft Matter, Hydrogels
- Turbulence, Aerodynamics, Geophysical Flows
- Material Rheology

The workshop also included poster sessions that allowed attendees to discuss research topics of mutual interest with the authors and co-authors of the posters.

Workshop participants met in afternoon breakout sessions to further discuss emerging research themes in each of the technical tracks and identify potential funding opportunities for collaborative team proposals. The workshop closed with a summary session where the track principals discussed ideas from the breakout sessions and identified teams to develop grant proposals and research working groups for the focus areas.

ME faculty member wins R&D 100 Award



Mark Bryden, mechanical engineering associate professor, is among the researchers at Iowa State University and the U.S. Department of Energy's Ames Laboratory to win a 2009 R&D 100 Award.

The award, presented annually since 1963, salutes the 100 most technologically significant products introduced into the marketplace over the past year. The *Chicago Tribune* has called the R&D 100 Awards the "Oscars of Invention."

Working with **Doug McCorkle**, an associate scientist with both Ames Lab and Iowa State's Virtual Reality Applications Center, Bryden has developed a software application that will help engineers design the next generation of highly efficient and low-emission power plants.

The software, called the Virtual Engineering Process Simulation Interface (VE-PSI), combines information about process simulation—data and models about chemical, physical, and biological processes—with computer-aided design drawings and fluid dynamics data to create a comprehensive, real-time display of power plant designs. In the interactive virtual environment, engineers can analyze multiple aspects of a proposed power plant at the same time with the aim of optimizing the overall system.

The 2009 R&D 100 Award marks the second for Bryden and McCorkle, who—along with colleague **Gerrick Bivins**—received a 2006 R&D 100 Award for another software tool.





From Distance Ed to a PhD

Eric Anderson started pursuing an advanced degree before he even realized it.

When he started taking classes online through the Distance Education program at Iowa State, his initial goal was to learn new ideas and processes that would benefit his daily work. Several classes later, it became clear that his course credits and professional interests could be turned into a master's degree in systems engineering.

Anderson works for John Deere in Dubuque, Iowa, as a vehicle performance engineer and is now a PhD student in mechanical engineering at Iowa State. "Throughout my 12-year career, John Deere has always been supportive of professional development," he says. "Now I'm enjoying a unique opportunity that allows me to telecommute while I work toward my doctorate degree."

Anderson and his family recently relocated to Ames from Galena, Illinois, to meet the residency requirement for the PhD program. He works from his home office for a majority of the week while he attends classes, and most weeks he travels to the Dubuque office for a day to work on site. And when he's not studying or working, he spends time with his wife and three children.

"Earning any degree while working requires life balance and dedication, but it's worth it," he says. "The Distance Education program is great for working professionals because they get to stay in the industry while taking courses. They get the financial stability of their job and the opportunity to learn new skills to help them excel in their careers."

Looking back on his experience as a distance student, Anderson says the program was a perfect fit for where he was in his professional career and personal life. While he would have liked to build more personal relationships with his professors and classmates at the time, he refers to the Distance Education program as a cornerstone for his continued professional development and personal growth.

"Because mechanical engineering is such a broad field, I'm always looking for new ways to keep learning and growing," he says. "The Distance Ed program, and now the PhD program, have proven to be wonderful opportunities for me to accomplish my goals."

The Department of Mechanical Engineering offers several options for professionals looking to advance their careers through continuing education:

- MS in mechanical engineering
- PhD in mechanical engineering
- MEng in mechanical engineering (a course-work only program)
- Interdisciplinary degrees, including human-computer interaction, biorenewable resources and technology, and systems engineering

Check out www.me.iastate.edu/academics/graduate-program for more information.

Faculty on the move

Promotions

- **Pranav Shrotriya** was promoted to associate professor with tenure.
- **Eliot Winer** was promoted to associate professor with tenure.

New appointments

- **Ted Heindel** stepped in as interim chair beginning July 1, and his appointment will continue until the next permanent chair is in place. He was also recently appointed the Art and Priscilla Bergles Professor of Thermal Science.
- **Jim Oliver** was named the Larry and Pam Pithan Professor of Mechanical Engineering.
- **Song-Chang Kong** was announced as the William and Virginia Binger Assistant Professor of Mechanical Engineering.
- **Adin Mann** was appointed as an assistant dean in the Graduate College.

Advance your career—online



Whether it's one class or an entire program, Distance Education courses in mechanical engineering provide technical and

managerial skills that will help you become an outstanding engineer.

The Department of Mechanical Engineering's master's of engineering is a coursework-only program with all courses delivered completely online.

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- **Flexible**—Study what interests you and develop your own schedule
- **Valuable**—Learn within the tradition of Iowa State's technical expertise and engineering excellence
- **Rewarding**—Experience professional independence, creativity, and leadership

Apply today!

Fall 2010 admission—Apply by January 10, 2010

Spring 2011 admission—Apply by July 10, 2010

Get more information

Visit www.me.iastate.edu/academics/graduate-program or contact **Amy Carver** at megradinfo@iastate.edu or 515 294-0838 for details.

ME welcomes two new professors

Erin MacDonald

Assistant Professor of Mechanical Engineering
Courtesy Appointment in Art and Design
Michael and Denise Mack 2050 Challenge Scholar



Through her research, **Erin MacDonald** adopts methods and insights from psychology and marketing to address sustainable engineering design problems.

MacDonald's dissertation research applied the theory of construction of preferences to engineering design, and it was nominated for the distinguished dissertation award at the University of Michigan. The main case study investigated inconsistent customer preference for sustainable products from one purchase decision context to the next.

MacDonald comes to Iowa State from the Massachusetts Institute of Technology (MIT), where she researched the design of Web sites to match cognitive styles in the marketing department of the Sloan School of Management. She was also an instructor in MIT's mechanical engineering department.

MacDonald has previously worked as a business consultant and is an award-winning product designer. She discusses the psychological intricacies of green design at companies such as Ford and Whirlpool.

At Iowa State MacDonald teaches classes on mechanical engineering design as well as creativity and imagination in engineering. She has taught design courses at the University of Michigan and robotic design at MIT.

W. Ross Morrow

Assistant Professor of Mechanical Engineering
Courtesy Appointment in the Department of Economics



Ross Morrow's research focuses on developing mathematical models and methods for coupled engineering and economic systems to inform environmental policy that relies on both engineering technology and market behavior.

Using a central game-theoretic model and Bertrand-Nash equilibrium pricing, Morrow's PhD dissertation provided new theoretical results and robust numerical methods for computing equilibrium prices in markets with large numbers of products and state-of-the-art stochastic demand models.

Following his PhD, Morrow studied transportation policy options for reducing greenhouse gas emissions as a postdoctoral research fellow in the Energy Technology Innovation Policy group at the Harvard Kennedy School's Belfer Center for Science and International Affairs.

As an assistant professor, Morrow will continue researching numerical methods for large-scale game-theoretic models of engineering and economic systems and undertake new research on economy-wide energy modeling that incorporates uncertainty and its impact on decision making. Morrow teaches classes on mechanical engineering design and mathematics. He has taught mechanical engineering design classes at the University of Michigan and the Massachusetts Institute of Technology.

ME department on recruitment mission

Three representatives from the ME department traveled across the Midwest on October 1, 2009, to build relationships with colleges and recruit underrepresented minority and female students. Their trip was part of a seminar outreach program **Janelle Miranda**, undergraduate program assistant, and **Amy Carver**, graduate program assistant, received funding for last year.

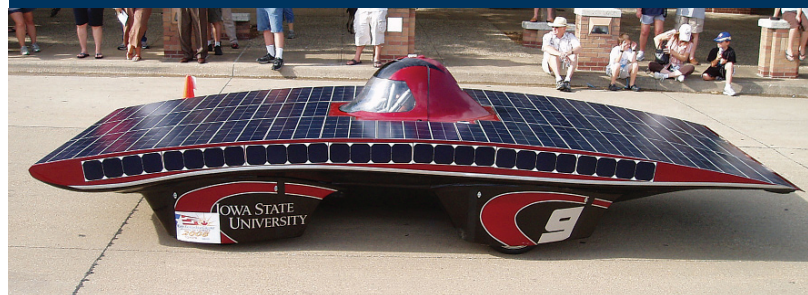
The award, a Retention and Recruitment Grant, is given to professional and scientific (P&S) employees who plan to address goals within Iowa State's strategic plan related to recruiting and retaining students. With the \$1,000 grant, Miranda and Carver developed an outreach program to strengthen targeted mechanical engineering recruitment activities for underrepresented minorities and females in the science, technology, engineering, and math fields.

On their recent trip, Carver, Miranda, and Assistant Professor LeAnn Faidley traveled to Augustana College in Rock Island, Illinois, and Truman State in Kirksville, Missouri. Faidley presented the current work going on regarding smart materials, while Carver discussed graduate program opportunities. Miranda was on hand to discuss transfer student options and future program relations with the institutions.

At Truman State the group met with the Society of Physics Students, and at Augustana College they met with interested physics/pre-engineering students. Faculty and students were receptive and excited to hear about Faidley's work at both institutions.

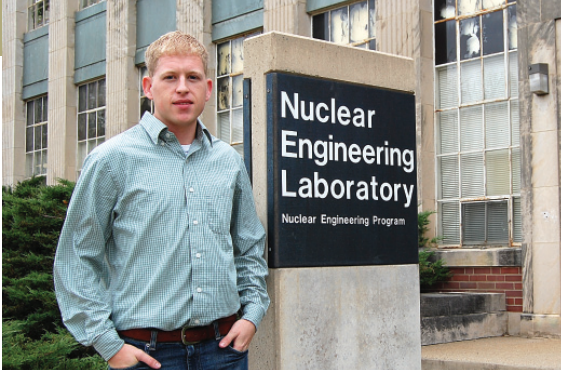
Carver and Miranda presented their outreach plan during the P&S Council's Retention and Recruitment Committee Forum on April 2, 2009, and were invited by the College of Engineering's Enrollment Services and Precollegiate Programs office to help showcase Iowa State University during the Invent Iowa program on April 25, 2009.

Solar car team celebrates 20th anniversary



Team PrISUM members were on the move this summer competing in Texas, working on a new car design, and promoting solar energy during the Sun Run. Be sure to check out the College of Engineering's video commemorating Team PrISUM's 20th anniversary available at <http://video.engineering.iastate.edu/?p=348>.

Nuclear engineering makes a comeback



ME senior Nick Howard is helping spread the word to students about career opportunities in nuclear engineering.

A year after nuclear engineering reemerged on campus through what is now a 15-credit minor program, student interest in learning about this energy source is growing.

And the timing couldn't be better. A large retiring workforce combined with the "nuclear renaissance" has increased the demand for engineers with experience in nuclear power.

Several of the program's courses are taught online through a collaboration with the Big 12 Engineering Consortium, an organization created to increase the accessibility of engineering courses in high-demand areas. Kansas State University, Texas A&M University, the University of Texas, and Iowa State each offer their nuclear engineering courses via distance education, introducing students to a variety of theory and application courses they may not have gotten otherwise.

As the program at Iowa State expands, **Greg Maxwell**, associate professor of mechanical engineering and program director for the minor, is working to add more on-campus classes and increase student awareness of the program.

Maxwell is currently working on developing a nuclear instrumentation laboratory course. "We want to give our students some hands-on experience with the various detectors and electronics used in the nuclear field and reinforce the basic concepts taught in other classes," he says. "We also want to develop high-performance computing capabilities to use state-of-the-art computer codes for modeling radiation transport."

A recent gift from the Omaha Public Power District (OPPD) will help with the initial lab setup, along with future course development and student scholarships. In addition, students will have opportunities to visit OPPD facilities and hear from experts with the organization.

With plans to build similar relationships with organizations in the Midwest, Maxwell feels that OPPD is a good example of how companies and the university can partner to bring valuable experiences to students.

He also hopes that organizing a student chapter of the American Nuclear Society (ANS) will help as well. **Nick Howard**, a senior in ME, is one of two students working to reinstate the chapter.

"We've done a lot of work behind the scenes to get our chapter up and running," Howard explains. "Now we are working on outreach and building a network with companies and individuals in the nuclear engineering field to provide insight to students."

One of the biggest points Howard hopes to get across during ANS meetings is the many job opportunities that are available to students with knowledge of nuclear power—something he realized during a summer internship with Exelon Nuclear.

While he learned a great deal about the industry from the hands-on experience, Howard says the initial training he was required to take was easier because of what he had learned through his courses.

"The governing equations of nuclear engineering are similar to other engineering disciplines," he explains. "Nuclear is another aspect of engineering that gives you a specific application of all those principles."

The nuclear engineering minor currently has 18 students enrolled—a number Maxwell and Howard agree will continue to increase. As it does, the program will need more support from organizations and alumni. If you want more information about the program or how you can help, contact Maxwell at gmaxwell@iastate.edu or 515 294-8645.

Florence Kimball Stoufer



Florence Kimball Stoufer was the first woman to receive an undergraduate degree from Iowa State's Department of Mechanical Engineering. She received the degree in 1908, and her accomplishment was captured by the department through a recognition award that was

previously given to female graduates of the program. The following information came from the award program.

Stoufer, who was 91 when she died in 1977, was a woman who showed rare business initiative in an era when few women ventured their talents outside the home. The intelligence, ambition, and energy with which she was endowed enabled her to live a rewarding and accomplished life, wherein she successfully combined the roles of engineer, wife, mother, and business woman.

She was born in 1885 in Anamosa, Iowa, the daughter of **Jessie** and **Charles E. Kimball**. The family foundry and machine shop was moved to Council Bluffs in 1892, where the operation was changed to manufacturing freight and passenger elevators. Before moving, Mr. Kimball taught practical mechanics briefly at Iowa State College in Ames.

Florence entered engineering school at Iowa State at the end of her junior year in high school. Her father suggested she study mechanical engineering, and she gamely entered those all-male classes and completed the work for her degree with an excellent grade average.

At Iowa State she met her husband, **Donald B. Stoufer**, who was captain of the football team and also an engineering student. They were married in 1911. Her husband joined the Kimball Elevator Company, and Florence applied her talents to maintenance and management of their real estate holdings. In 1940 she took over management of the historic old Ogden (House) hotel, a legacy from her father. Don Stoufer died in 1955, and she continued to administer their properties until her death.

All three of their children graduated from Iowa State University as well—**Richard** and **William** in the College of Engineering, and **Lucy (Beall) Graeme** in home economics—as well as several of their grandchildren. At Iowa State, she served as first president of Sigma Sigma Chapter of Kappa Delta sorority and in 1976 was awarded the Alumni Key by the Omaha-Council Bluffs chapter of the Iowa State University Alumni Association.

Faithful first of all to home and family, still she gave generously of time to many worthy organizations, chief of them her church. Friends and family alike admired her joyous, affirmative attitude toward life. "How lucky I've been!" was her frequent remark, and to the end she gave thanks for her good life.

Do you remember?

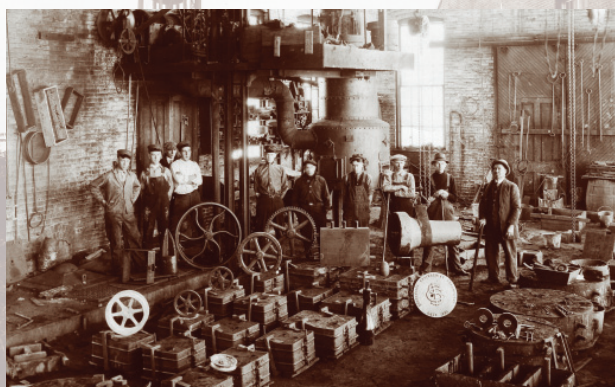
What do you remember about the old ME buildings?



There was Building A, the Foundry; Building B, the Forge Shop; and the Mechanical Engineering Laboratory with the Steam and Gas Lab Unit and the Machine Shop Unit. Where was your favorite place to hang out? What classes really stuck with you throughout your career?

Send memories about your experiences in Iowa State's mechanical engineering department to mealumni@iastate.edu. Be sure to include what you are up to now, your degree earned, and your year of graduation. We look forward to hearing from you!

In the previous issue of *Dimensions*, "Do you remember?" featured a photo of manhole covers that were manufactured by mechanical engineering students of the early and mid-1900s. These covers were created in the machine shop and cast in the foundry. They were used throughout the campus and some are still in use today.



Historical photos from Iowa State University Library/Special Collections Department



While Professors Emeritus **Al Joensen** and **George Serovy** came to campus after the covers had been manufactured, they both acknowledged the importance the covers played in the department's history.

"The department's old building had three parts, and in one

section there was a foundry where they made the manhole covers," Joensen says. "It was done as training for students wanting to become mechanical engineers. They had to make the forms and produce the casting as part of the curriculum."

Serovy remembers doing similar projects in classes, but nothing as essential to the campus as the manhole covers. "Everywhere you went on campus, you would see the covers," he says. "The lessons we learned in foundry are unique and will probably never be duplicated again. The teachers had no degree, just a lot of skill and knowledge of their trade. They taught us what we needed to know to be a mechanical engineer."

In addition to the manhole covers, students also made brass doorknobs with the Iowa State College logo on them.

We also received letters from alumni who shared their memories from their days at Iowa State. Portions of their letters follow.



Donald W. Niemand, BSME'49

"I enrolled at ISC in Jan '46 on the GI Bill. It was an exciting time for me and for the school. Returning WWII veterans flooded the classrooms. Professor Black became our department head, and several retired ME profs were called back to meet the demand...I suffered through the humiliating

63-0 homecoming defeat by Oklahoma, when I was tempted to discard my band uniform and try to help out. But I worked hard and learned a lot. I started my career working on the atomic bomb and went on to a successful 50-year career in aerospace."



Rollo S. Pickford, BSME'51

"My first contact with **Henry Black** resulted from a rather strange situation. My thermodynamics class began at 11:00 a.m. and was supposed to be over at 11:55 a.m., which allowed just enough time for me to rush over to the sorority house where I was a waiter. However, two or three times a week

at 11:53 a.m. the professor announced a "shotgun" quiz. I could not afford to lose my job (meals free plus \$5.00 cash/week) and seldom could finish the quiz.

At the end of the quarter came a request from Henry Black to meet in his office. He was a pleasant and very direct person: 'Why do you have respectable grades on full tests, lab work, and homework, but "F's" on most "shotgun" tests.' After I explained, a contemplative look came over his face and after a long pause, he began firing technical questions as I scrambled to provide answers. Fifteen minutes later, he took a pen, scratched out the professor's grade and wrote down a respectable grade.

Henry Black was a very perceptive leader who obviously reviewed the progress of his students. He was technically sharp and always willing to hear your views before making decisions. I certainly respected him and, better yet, found him a true encourager to a person who was anxious to learn."



Harry Shainian, BSME'82

"The best ME professor I ever had was **Joseph Baumgarten** because he motivated me to study and learn his material...I remember **Bill Bathie** the most because he would talk to students and answer their questions and try to give them good council. He looked like an 'engineer' and it seemed that he liked his job and that he wanted to see students succeed."

Department of Mechanical Engineering

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